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(54) Bearing means for a gun barrel

(57) The invention relates to bearing means for a gun barrel 1 in the breech casing of a large-calibre firearm of the type in which the breech casing comprises a substantially sleeve-formed member 2 enclosing the rear part of the gun barrel. The bearing means comprises two separate ring-shaped parts 4, 5 located at the side of each other and radially displaced so that one part 4 is engaging the gun barrel surface and the other part 5 engaging the sleeve member 2 of the breech casing. The two parts 4, 5 are separated by means of a number of cylindrical pins 8 so that a small air gap 9 is formed between them which prevents heat from being transferred from the gun barrel 1 via the bearing means to the breech casing when the gun barrel is heated upon firing. Thanks to the cylindrical pins 8 the gun barrel 1 is centered even when heated.

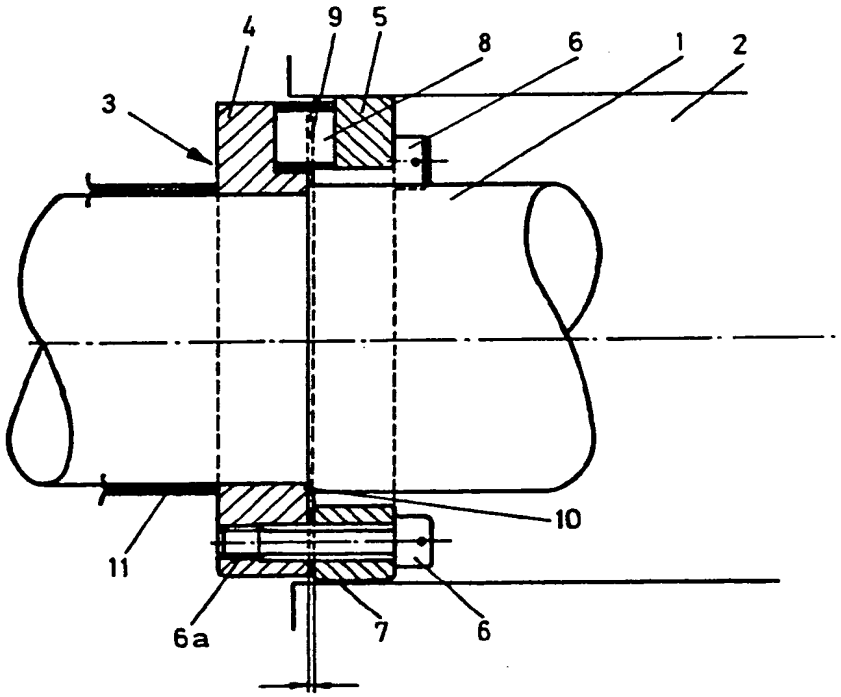

Fig.1

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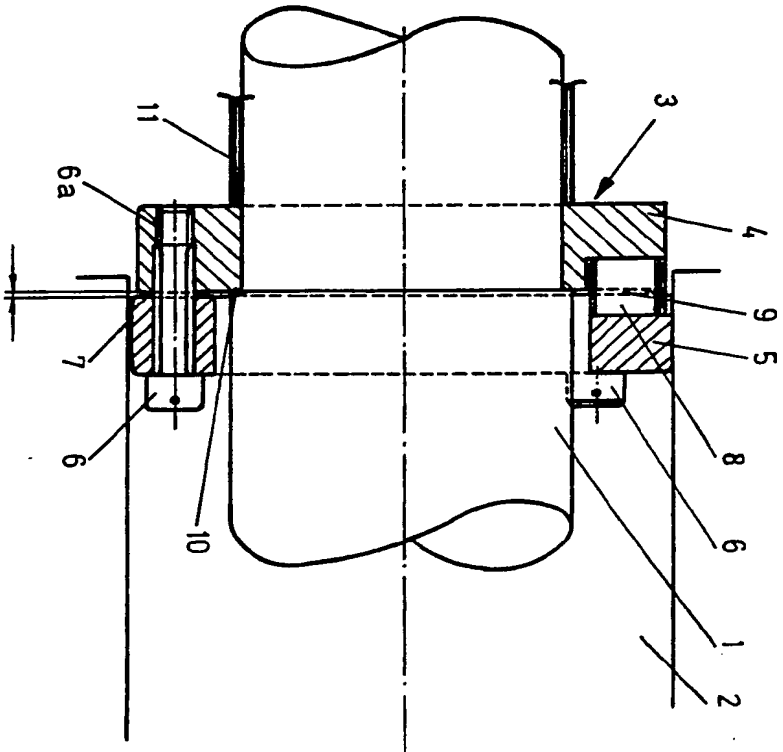

Fig.1

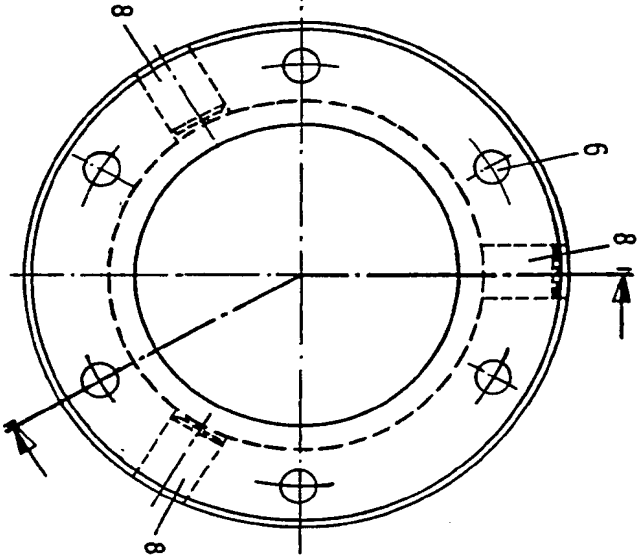

Fig.2

SPECIFICATION

Bearing means for a gun barrel

The present invention relates to bearing means for a gun barrel mounted in the breech casing of a large-calibre firearm of a type in which the breech casing comprises a sleeve member enclosing the rear part of the gun barrel.

For weapon of this type the breech casing is rigidly affixed to the gun mount but the barrel, the screw mechanism and so forth belong to the recoil system which take part in the recoil movements of the weapon. In order to permit recoil movements, the barrel therefore must be displaceable mounted in the breech casing.

In the bearing means between the gun barrel and the breech casing there must be a specific play to permit dimensional changes caused by the heating of the gun barrel. Such play is not desired for other reasons, however, mainly because it gives rise to an unwanted spread of the shots. Such spread of shots caused by the gun itself upon firing has previously been accepted mainly due to the fact that the contribution from the fire control equipment has dominated the spread of shots. Efforts have therefore mainly been concentrated on the problem how to reduce this contribution from the fire control equipment.

Now that it is possible to determine the position of a target more precisely and that more sophisticated computers are used in the fire control equipment, these conditions are changing, however. Previously the contribution of the distribution of shots caused by the fire control equipment was about 3–5 mrad but today it has been reduced to 1–2 mrad, i.e. approximately the same magnitude as the gun firing spread. This means that efforts now also are concentrated on the problem of how to reduce also the gun firing spread.

The gun firing spread is mainly caused by the oscillating movements of the gun barrel and the elevating system which movements are generated through firing. The oscillating movements have several causes and may for instance depend upon the forces in recoil brakes, recoilforces on the upper carriage and forces generated by the screw mechanism when closing, opening and loading the chamber of the barrel. A study of such oscillating movements has disclosed that the play between the barrel and the breech casing gives a significant contribution to the gun firing spread.

Recently measures have been taken to limit also the gun firing spread. Mainly this has been achieved by introducing specific damping means into the weapon system. Such damping means, however, makes the gun constructions heavier and more expensive and has not specifically reduced the gun firing spread caused by the play between the barrel and the breech casing.

By the Swedish patent application No. 8103297–1 it is previously known to design the bearing means in such a way that the play is mainly eliminated. More specifically the bearing means comprises a sleeve member with a plurality of finger springs distributed about the peripheral surface of the gun barrel and engaging the surface with a certain spring force in a plane perpendicular to the longitudinal axis of the gun barrel.

Thanks to the finger springs engaging the peripheral surface of the gun barrel the play between the gun barrel and the breech casing is compensated. Any dimensional changes due to heating of the gun barrel upon firing is effectively compensated. Due to the mass of the recoil system and the gravity forces imparted thereto the spring forces of the finger springs must be high. This means an undesired wear between the bearing means and the peripheral gun barrel surface.

In order to reduce said wear the external gun barrel surface has been provided with an enlarged cylindrical part so that the finger springs are engaging the external surface of the gun barrel only during a part of the rearward recoil movement of the gun barrel.

Another disadvantage with this type of gun barrel bearing means is the relatively complicated manufacturing method required for the finger springs. Furthermore it is important that the spring force for the different finger springs really is the same all around the gun barrel surface.

It is an object of the present invention to provide gun barrel bearing means in which the play can be mainly eliminated and which is also self-centering. According to the invention the bearing means is made in the form of a ring which comprises two separate, adjacent parts which are joined so that one part is engaging the external surface of the gun barrel and the other part engaging the breech casing sleeve member.

In a preferred embodiment of the invention the two parts are joined by means of screws but separated by a small air gap to prevent heat from being transferred from the gun barrel part to the breech casing part.

In the following the invention will be described in more detail with reference to the accompanying drawing which illustrates a preferred embodiment of the bearing means and where Fig. 1 shows a longitudinal cross-sectional view of the gun barrel bearing means and the longitudinal axis of the gun barrel and Fig. 2 the bearing means seen in the gun barrel direction.

In Fig. 1 only a part of the gun barrel 1 of a large-caliber weapon, for instance a tank gun, a permanently emplaced coast artillery gun, a field artillery gun or other automatic gun is illustrated. The breech casing com-

prises a substantially cylindrical sleeve member 2 enclosing a rear part of the gun barrel 1. During recoil the barrel is moved relative to the breech casing which is rigidly affixed to the gun mount. The gun barrel 1 is mounted in the breech casing via a ring-shaped bearing means 3 which is affixed to the gun barrel. During recoil the bearing means is displaced with respect to the breech casing and is sliding along the same.

The bearing means 3 comprises two ring-shaped parts 4 and 5 which are arranged at the side of each other but radially displaced so that one part 4 is engaging the peripheral gun barrel surface while the other part 5 with a minimal play is engaging the breech casing sleeve member surface. The outer radius of the first part 4 is clearly less than the radius of the adjoining breech casing while the inner radius of the other part 5 clearly exceeds the outer radius of the adjoining gun barrel surface. The two parts 4 and 5 are hold together by a number of comparatively long and small screws or bolts 6, six screws illustrated in the drawing. The screws are provided with short external threads 6a but the rest of the screws has a diameter which is less than the screw hole diameter. The other part 5 has a slightly rounded contact surface 7 to facilitate the sliding movement along the breech casing surface.

Between the two parts 4 and 5 a number of, three in the drawing, cylindrical pins 8 are disposed so that a small radial air gap 9 is formed between the two parts. The air gap prevents heat to be transferred from the gun barrel via the bearing means to the breech casing when the gun barrel is heated during firing. The air gap width is approximately 0,5–1 mm, preferably 0,6 mm. The cylindrical pins 8 are disposed in circular holes formed by recesses in the opposing surfaces of the two parts.

In order to keep the bearing means in its correct axial position on the gun barrel the part 4 is affixed to the gun barrel by a flange 10 on the peripheral barrel surface and a spacing sleeve member 11 embracing the peripheral gun barrel surface. In case two or more rings 3 are disposed between the breech casing and the gun barrel the distance between the rings is permanent by means of such spacing sleeve members.

Due to the radial displacement m between the two ring-shaped parts 4 and 5 and the air gap 9 between the parts heat is prevented from being transferred from the gun barrel to the breech casing when the gun barrel is heated upon firing. This means that the play between the outer part 5 and the breech casing can be kept minimal and substantially eliminated.

Another advantage with the ring-shaped gun barrel bearing means is the fact that it is self-centering, i.e. the gun barrel is centering even when heated due to the cylindric pins 8. When the gun barrel is heated upon firing heat is conducted to the inner ring-shaped part 4 which is allowed to expand radially via the cylindrical pins 8.

Thanks to the air gap 9 the outer ring-shaped part 5 is only heated to a very small extent and its dimensions are not changed. The two parts 4 and 5 are displaced relative to each other via the cylindrical pins 8 when heated.

The invention is not limited to the above preferred embodiment but can be modified within the scope of the following claims.

CLAIMS

1. Bearing means for a gun barrel mounted in the breech casing of a large-caliber firearm of a type in which the breech casing comprises a sleeve member enclosing the rear part of the gun barrel characterized by a ring member (3) disposed between the gun barrel (1) and the sleeve member (2) of the breech casing which ring member (3) comprises two separate parts (4, 5) arranged at the side of each other but radially displaced with respect to each other so that one part (4) is engaging the outer peripheral gun barrel surface and the other part (5) engaging the breech casing sleeve member.

2. Bearing means according to claim 1 characterized in that said two parts (4, 5) are joined together with a small air-gap (9) between the two parts.

3. Bearing means according to claim 2 characterized in that the two parts (4, 5) are joined together by means of a number of screws (6) and separated by a number of pins (8) so that said air-gap (9) is formed between the two adjacent ring-shaped surfaces of the two parts.

4. Bearing means according to claim 3 characterized in that the pins are cylindrical and located in circular holes formed by corresponding recesses in the two adjacent surfaces of the two parts.

5. Bearing means according to claim 1 characterized in that the ring (3) is axially affixed to the gun barrel (1) by means of a flange (10) and/or a spacing member (11).

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